Chemistry 1130 Exam 3 Study Guide

Chapter 12

12.1 a) Identify alkenes, alkynes and aromatics as unsaturated hydrocarbons. Determine the number of hydrogen atoms needed to complete an alkene structure.

b) Give the IUPAC name for an alkene or cycloalkene structure.

- Master Tutor Section 12.1
- Review Section 12.1 in the Concept Summary
- Review Examples 12.1, 12.2 and Learning Checks 12.1, 12.2
- For practice, do Exercises 12.4, 12.6, 12.12

12.2 Given an alkene name or structure, determine if geometric isomerism can occur. Identify cis-and trans- isomers.

- Master Tutor Section 12.2
- Review Section 12.2 in the Concept Summary
- Review Example 12.3 and Learning Check 12.3
- For practice, do Exercises 12.18, 12.20

12.3 a) Know alkanes and alkenes are not soluble in water but are soluble in hexane. They are also less dense than water. Know the names and products of the addition reactions that alkenes can undergo (ie. Hydration produces an alcohol, halogenation produces alkyl halides) b) Predict reactants or products from an alkene halogenation reaction.
c) Using Markovnikov's Rule, predict the major product formed by the addition of a halogen containing acid (H-X) to an alkene.
d) Know what reactants and catalysts are needed for alkene hydrogenation and alkene hydration reactions. Predict the major products formed by these reactions, using Markovnikov's Rule for hydration.

- Master Tutor Section 12.3
- Review Section 12.3 in the Concept Summary

- Review Example 12.4 and Learning Checks 12.4-12.7
- For practice, do Exercises 12.26, 12.28

12.4 Recognize a C=C monomer is needed to make an addition polymer. Predict which monomer is needed to make a polymer and vice versa.

- Master Tutor Section 12.4
- Review Section 12.4 in the Concept Summary
- Review Learning Check 12.8
- For practice, do Exercise 12.32

12.5 Identify alkyne structures or formulas. Give IUPAC names for alkynes. Predict the number of hydrogen atoms necessary to complete an alkyne structure. Recognize the importance of acetylene as an alkyne.

- Master Tutor Section 12.5
- Review Section 12.5 in the Concept Summary
- Review Learning Check 12.9
- For practice, do Exercise 12.42

12.6 Differentiate between aliphatic and aromatic hydrocarbons. Recognize that each carbon in a benzene ring can only have 1 substituent attached to it.

- Master Tutor Section 12.6
- Review Section 12.6 in the Concept Summary
- For practice, do Exercise 12.48

12,7 Give IUPAC names for benzene containing compounds. May include common names of aniline, toluene, or phenol. If a benzene ring is part of a more complex hydrocarbon, name it as a phenyl-group.

- Master Tutor Section 12.7
- Review Section 12.7 in the Concept Summary
- Review Example 12.5 and Learning Check 12.10
- For practice, do Exercises 12.52, 12.54, 12.56, 12.60

12.8 Know that aromatics are hydrophobic and can be used as solvents (benzene), and are found in amino acids and vitamins. Identify polycyclic aromatics and know they are hydrophobic and carcinogenic.

- Master Tutor Section 12.8
- Review Section 12.8 in the Concept Summary
- For practice, do Exercises 12.65, 12.66

Remember to place the Key Reactions on your exam note sheet.

Chapter 17

17.1 Recognize the aldehyde, ketone and hydroxyl (-OH) functional groups found in carbohydrates. Differentiate between mono-, di-, and polysaccharides.

- Master Tutor Section 17.1
- Review Section 17.1 in the Concept Summary
- For practice, do Exercises 17.2, 17.4

17.2 Determine the number of chiral carbons in a chemical structure. Know the definition of a stereoisomer and an enantiomer.

- Master Tutor Section 17.2
- Review Section 17.2 in the Concept Summary
- Review Examples 17.1-17.3 and Learning Checks 17.1-17.3
- For practice, do Exercises 17.6, 17.8

17.3 Given a Fischer projection, determine whether it is a D- or Lenantiomer. Know that optical activity refers to property of rotating a plane of polarized light and is determined by the presence of a chiral carbon.

- Master Tutor Section 17.3
- Review Section 17.3 in the Concept Summary
- Review Example 17.4 and Learning Checks 17.4, 17.5
- For practice, do Exercises 17.12, 17.14, 17.16

17.4 Identify a monosaccharide as a keto- or aldo- triose, tetrose, pentose or hexose.

- Master Tutor Section 17.4
- Review Section 17.4 in the Concept Summary
- Review Learning Check 17.6
- For practice, do Exercise 17.22

17.5 a) Know the definitions of Haworth structure, furanose ring, pyranose ring, anomers, anomeric carbon, and glycosidic linkage.
b) Recognize that a reducing sugar can be oxidized in the presence of a Cu²⁺ ion to form a red-orange precipitate. All monosaccharides are reducing sugars. Know cyclical monosaccharides contain hemiacetal or hemiketal groups which are changed to acetals or ketals, respectively, when a glycoside is formed.

- Master Tutor Section 17.5
- Review Section 17.5 in the Concept Summary
- Review Example 17.5 and Learning Checks 17.7, 17.8
- For practice, do Exercises 17.28, 17.34

17.6 a) Know fructose is a ketohexose, the sweetest of all sugars and is sometimes called fruit sugar or levulose. Know ribose and deoxyribose are sugars found in the nucleic acids RNA and DNA, respectively.b) Know glucose is an aldohexose that forms a hemiacetal in cyclical formation. It is nutritionally the most important sugar and is sometimes

called blood sugar or dextrose. It is found in a 1:1 ratio with fructose in hone.

- Master Tutor Section 17.6
- Review Section 17.6 in the Concept Summary
- For practice, do Exercises 17.36, 17.38

17.7 a) Know the disaccharide maltose is formed during the digestion of starches and is composed of 2 glucose subunits. The milk sugar, lactose, is made up of glucose and galactose subunits.b) Know sucrose is a disaccharide made from glucose and fructose. It is found in flower nectar, sugar cane and sugar beets. Hydrolysis of it makes invert sugar, which is a 1:1 ratio of glucose and fructose.

- Master Tutor Section 17.7
- Review Section 17.7 in the Concept Summary
- For practice, do Exercise 17.44

17.8 a) Recognize glucose can form the polysaccharides cellulose, amylose, amylopectin and glycogen. Cellulose is a structural material found in plant cells. Glycogen is stored in the liver and muscle cells of animals. It is similar in structure to amylopectin.

b) Know the following have these glycosidic linkages:

Cellulose: $\beta 1 \rightarrow 4$ Amylose: $\alpha 1 \rightarrow 4$ Amylopectin: $\alpha 1 \rightarrow 4$ and $\alpha 1 \rightarrow 6$ Glycogen: $\alpha 1 \rightarrow 4$ and $\alpha 1 \rightarrow 6$

- Master Tutor Section 17.8
- Review Section 17.8 in the Concept Summary
- For practice, do Exercises 17.53, 17.54

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Chapter 18

18.1 Know the definition and characteristics of a lipid. Categorize a lipid as saponifiable simple, saponifiable complex, or nonsaponifiable.

- Master Tutor Section 18.1
- Review Section 18.1 in the Concept Summary
- For practice, do Exercise 18.4

18.2 Recognize that micelles have long chain hydrophobic tails on the interior and carboxylate hydrophilic heads on the exterior. Know fatty acids are straight chained with an even number of carbon atoms, usually between 10-20 carbons. Differentiate between saturated, monounsaturated and polyunsaturated fatty acids and how this affects their melting points.

- Master Tutor Section 18.2
- Review Section 18.2 in the Concept Summary
- For practice, do Exercises 18.6, 18.8

18.3 Identify the structural components of a triglyceride: glycerol backbone, ester linkages, long chain fatty acids. Differentiate between fats (animals) and oils (plants) based on the amount of unsaturation and melting points.

- Master Tutor Section 18.3
- Review Section 18.3 in the Concept Summary
- For practice, do Exercise 18.12

18.4 Know that hydrogenation of an unsaturated oil (ie. corn oil) makes a higher melting point product (ie. margarine). Hydrolysis of a triglyceride makes glycerol and 3 fatty acids. Saponification of a triglyceride makes glycerol and fatty acid salts (soap).

- Master Tutor Section 18.4
- Review Section 18.4 in the Concept Summary

- Review Learning Checks 18.2, 18.3, 18.4
- For practice, do Exercise 18.21

18.5 Recognize that upon hydrolysis, waxes make a long chain alcohol and a fatty acid. Recognize the structure of a wax. Know that waxes are protective coatings.

- Master Tutor Section 18.5
- Review Section 18.5 in the Concept Summary
- For practice, do Exercise 18.23

18.6 a) Know the components of phosphoglycerides (fatty acids, glycerol, phosphate and an amino alcohol) and their structure. They are found in cell membranes.

b) Differentiate between lecithin and cephalins based on their amino alcohol component. Know lecithin is an emulsifying agent and lipid transporter in the blood.

- Master Tutor Section 18.6
- Review Section 18.6 in the Concept Summary
- Review Learning Check 18.5
- For practice, do Exercises 18.28, 18.30, 18.32

18.7 Know sphingolipids have a sphingosine amino alcohol backbone, rather than glycerol. Glycolipds are a type of sphingolipids and contain a carbohydrate group. Both are found in brain and nerve tissue.

- Master Tutor Section 18.7
- Review Section 18.7 in the Concept Summary
- For practice, do Exercise 18.34

18.8 Differentiate between prokaryotic and eukaryotic cells based on the presence of organelles. Both have a cytoplasm. Know the fluidmosaic model of a cell membrane and the structure of the lipid bilayer.

- Master Tutor Section 18.8
- Review Section 18.8 in the Concept Summary
- For practice, do Exercises 18.40, 18.42

18.9 Know cholesterol (4 fused rings) is a steroid lipid and is used to make bile salts, adrenocorticoid hormones and sex hormones. Bile salts act as emulsifying agents, similar to soap, in the digestive tract.

- Master Tutor Section 18.9
- Review Section 18.9 in the Concept Summary
- For practice, do Exercises 18.44, 18.48

18.10 Know there are 2 categories of steroid hormones: adrenocorticoid and sex hormones. Know the functions of the 2 types of adrenocorticoids: mineral corticoid (ie. aldosterone) and glucocorticoids (ie. cortisol). Identify male sex hormones as androgens.

- Master Tutor Section 18.10
- Review Section 18.10 in the Concept Summary
- For practice, do Exercise 18.50

18.11 Recognize that prostaglandins are made from arachidonic acid (an unsaturated fatty acid) and have hormone like effects in the body. Know what functions prostaglandins perform.

- Master Tutor Section 18.11
- Review Section 18.11 in the Concept Summary
- For practice, do Exercise 18.56

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